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The Global Brain is Neither Global nor a Brain

Adaptive Webs for Heterarchies

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The Global Brain

Is Neither Global nor a Brain

- A concept built on meta-meta-metafors...
  - Analogy with social autopoiesis, which is an analogy with organisms in an analogy with metabolism.
- No Global Identity
  - Autopoiesis, metabolism and the like lead tothe idea of self-production of a “self-other” distinction from the self-organization of building blocks in an environment.
    - E.g. social insects
  - How does one identify a self-other distinction with a super-organism or a global brain?

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The Global Brain

Is Neither Global Nor a Brain

- Disembodied Brain
  - Disembodied brains do not exist, not even in networks.
  - Brains have evolved via natural selection in an embodied interaction with an environment.
    - This requires populations of material-symbol reproductive units (see papers on symbol-matter requirements for open-ended evolution)

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The Global Brain

Is Neither Global Nor a Brain

- Evolutionary Processes for the Global Brain
  - Use selection in a generalized sense while highjacking the capabilities of Natural Selection
    - Brain selection: reinforcement learning is not Natural Selection!
    - Memetic evolution: no identifiable mater-symbol reproducing units
- If the Global Brain is to rely on an evolutionary theory, we need a stricter theory of possible evolutionary processes
  - Rather than a discourse based on meta-meta-metaphors.

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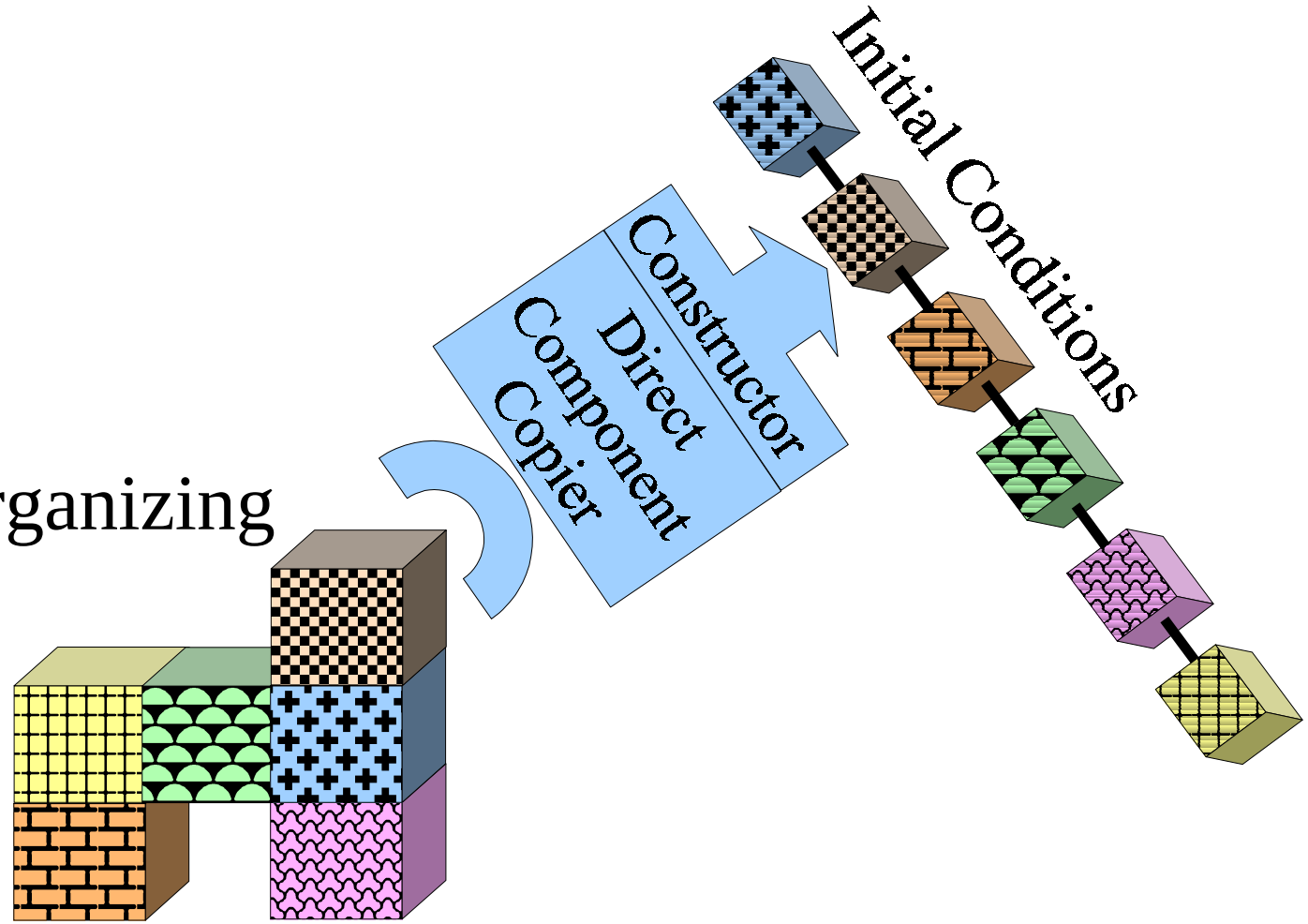
Mapping Selection Processes

Simulations of Evolutionary Potential: Self-Inspection



Self-Organizing Agent

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National Laboratory

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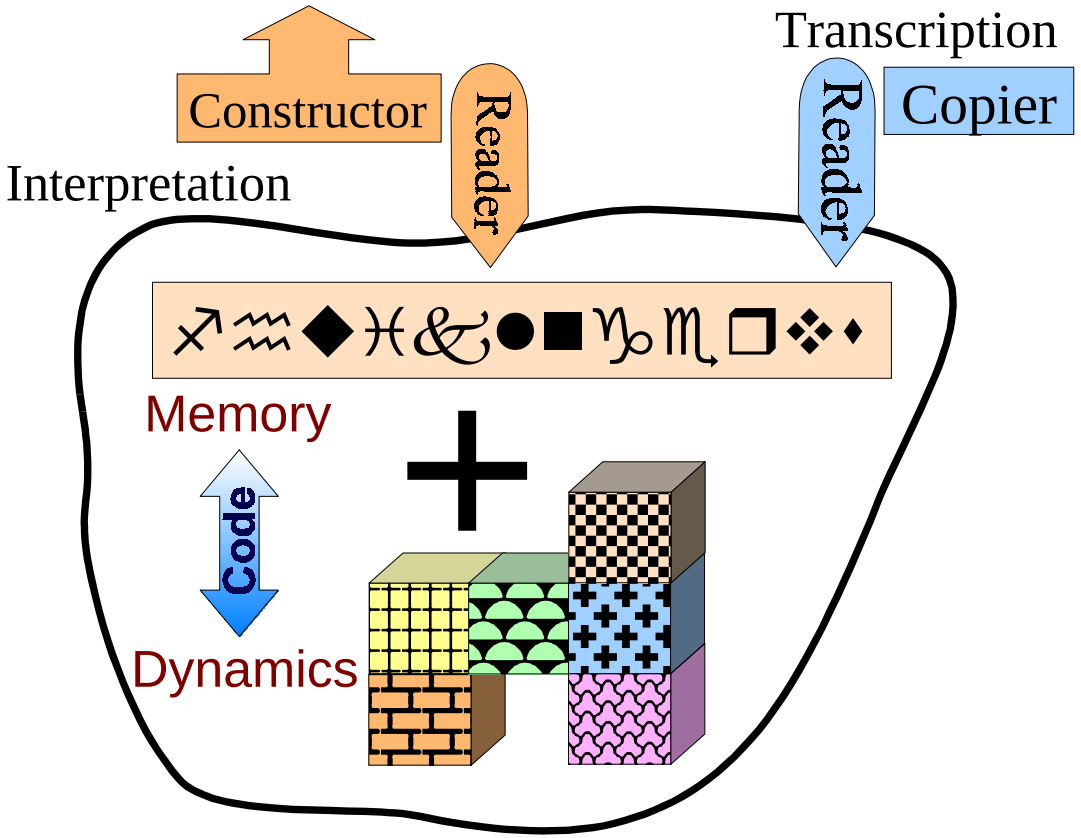
Mapping Selection Processes

Simulations of Evolutionary Potential: Coded Reproduction



Self-Organizing
Agent
+ Description

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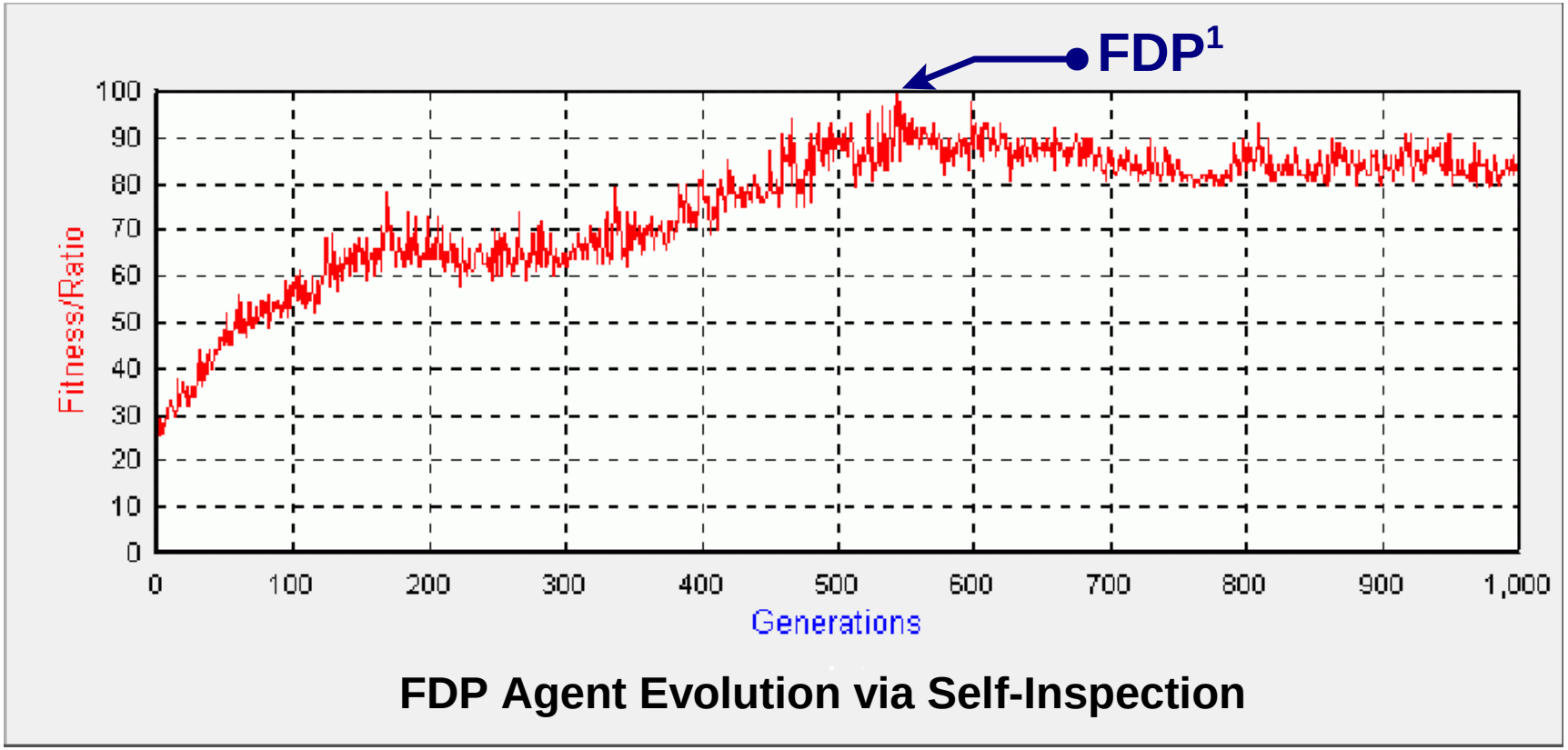
Mapping Selection Processes

Simulations of Evolutionary Potential



FDP Agent Evolution via Self-Inspection

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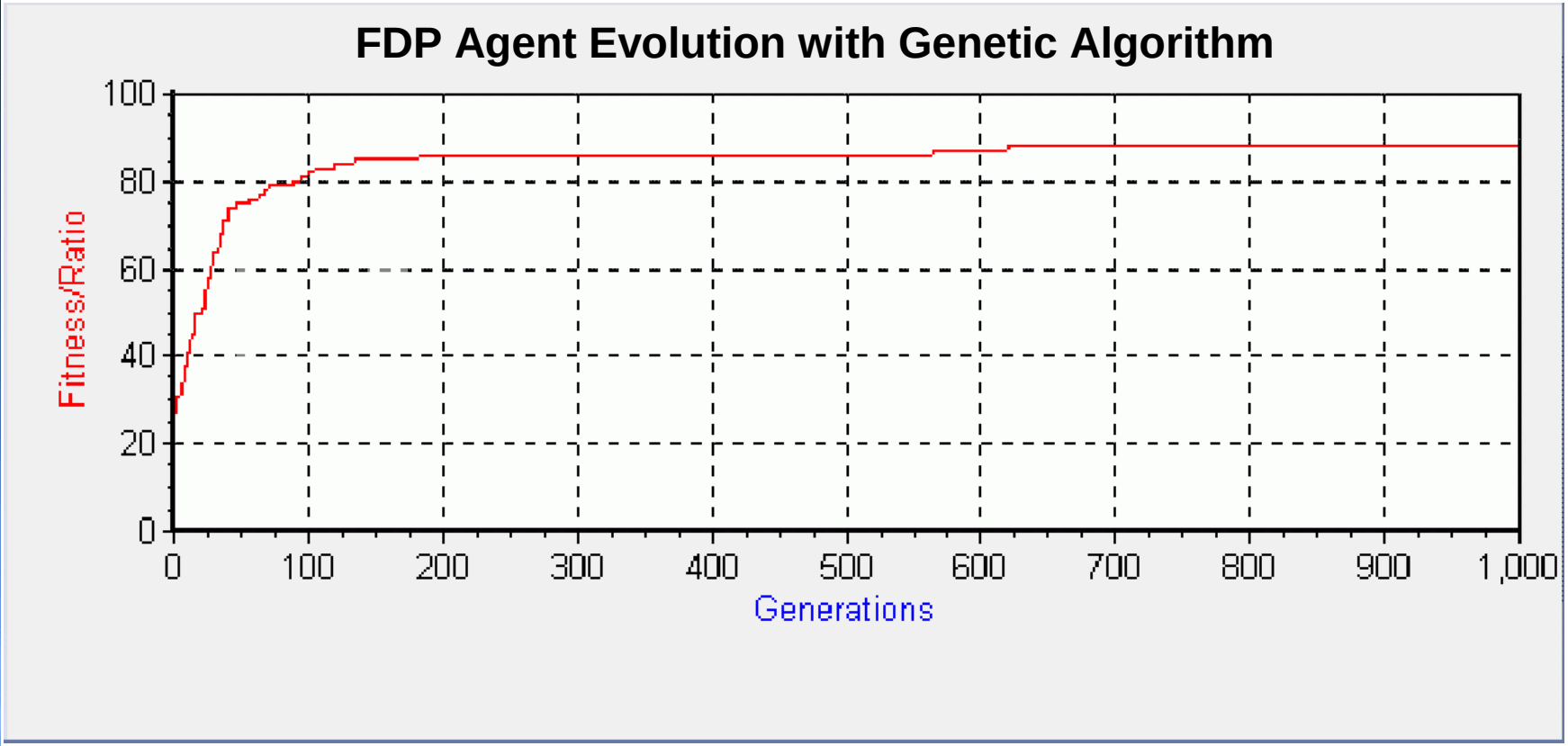
Mapping Selection Processes

Simulations of Evolutionary Potential



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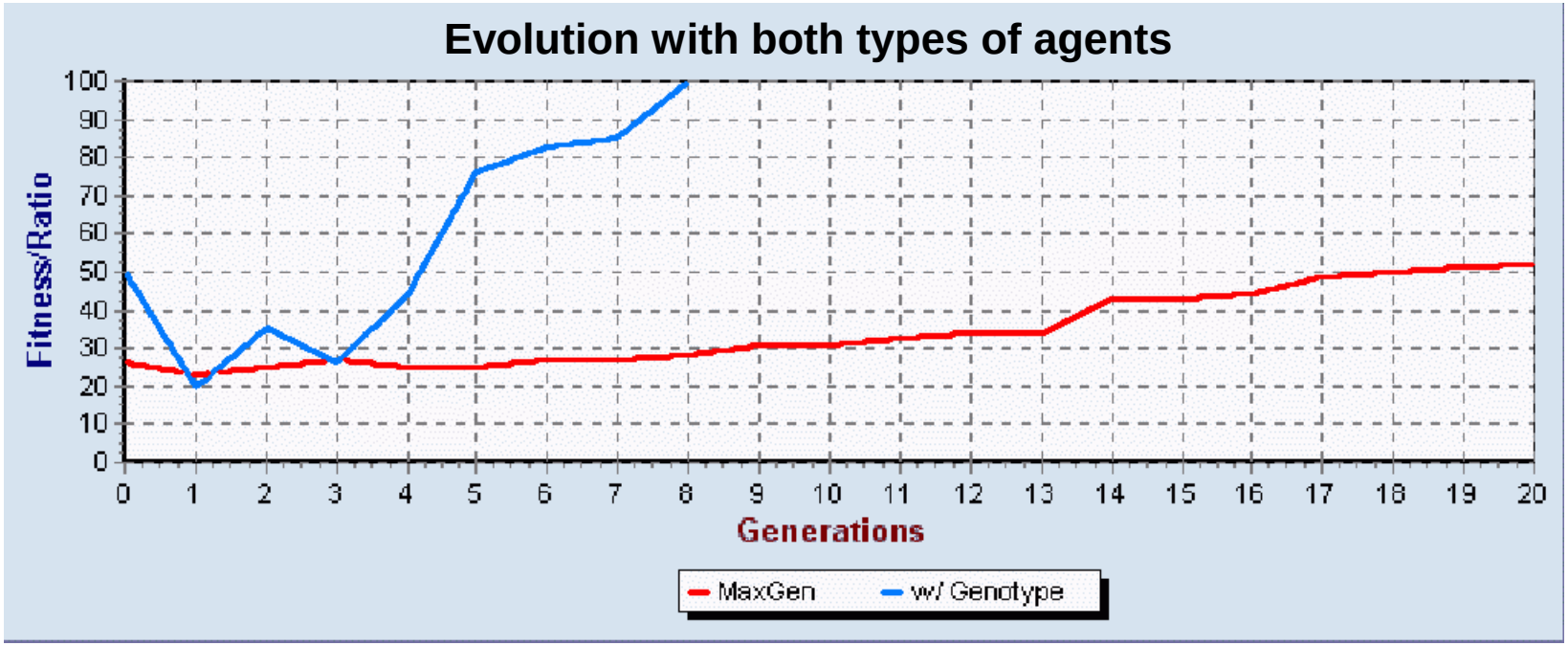
Coded Vs. Noncoded Agents

Simulations of Evolutionary Potential



Under most conditions and types of evolutionary algorithms, coded agents overtake the population in a small number of generations. /pattee/rocha.html

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Coded vs. Noncoded Agents

With high values of variation

Evolution with both types of agents

With too much genetic variation, the stability of descriptions is lost, resulting in occasional taking over of the population by noncoded agents.
/pattee/rocha.html

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How To Study Social Networks Mediated by Knowledge Networks?

Exploring Other Concepts

- Other Concepts and Guiding Principles
  - Heterarchies
  - Control Hierarchies
- Engineering of Enabling Technology
  - Adaptive Webs
  - Empirical Study of the Chracteristics of Networks
  - Generate Predictive Analysis Tools

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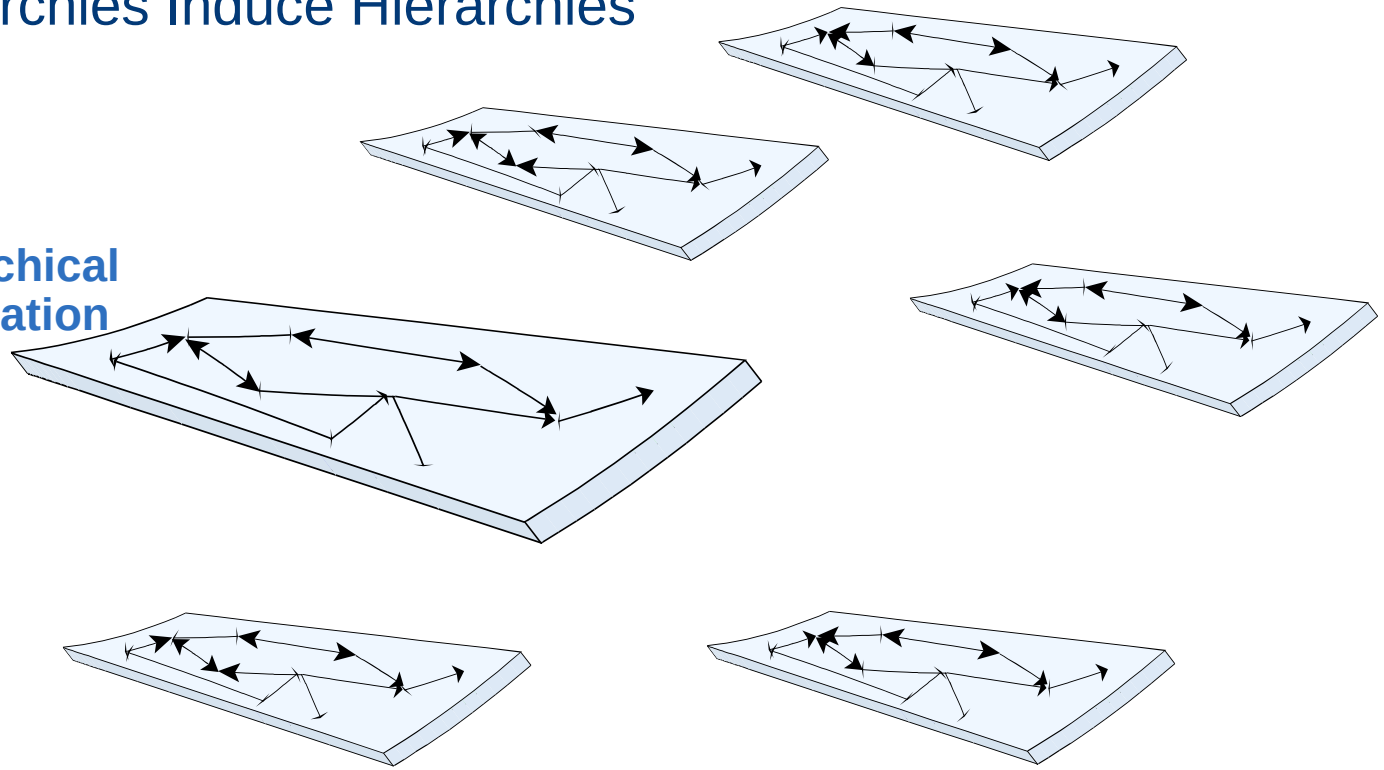
Control Hierarchies

Heterarchies Induce Hierarchies

Heterarchical Organization



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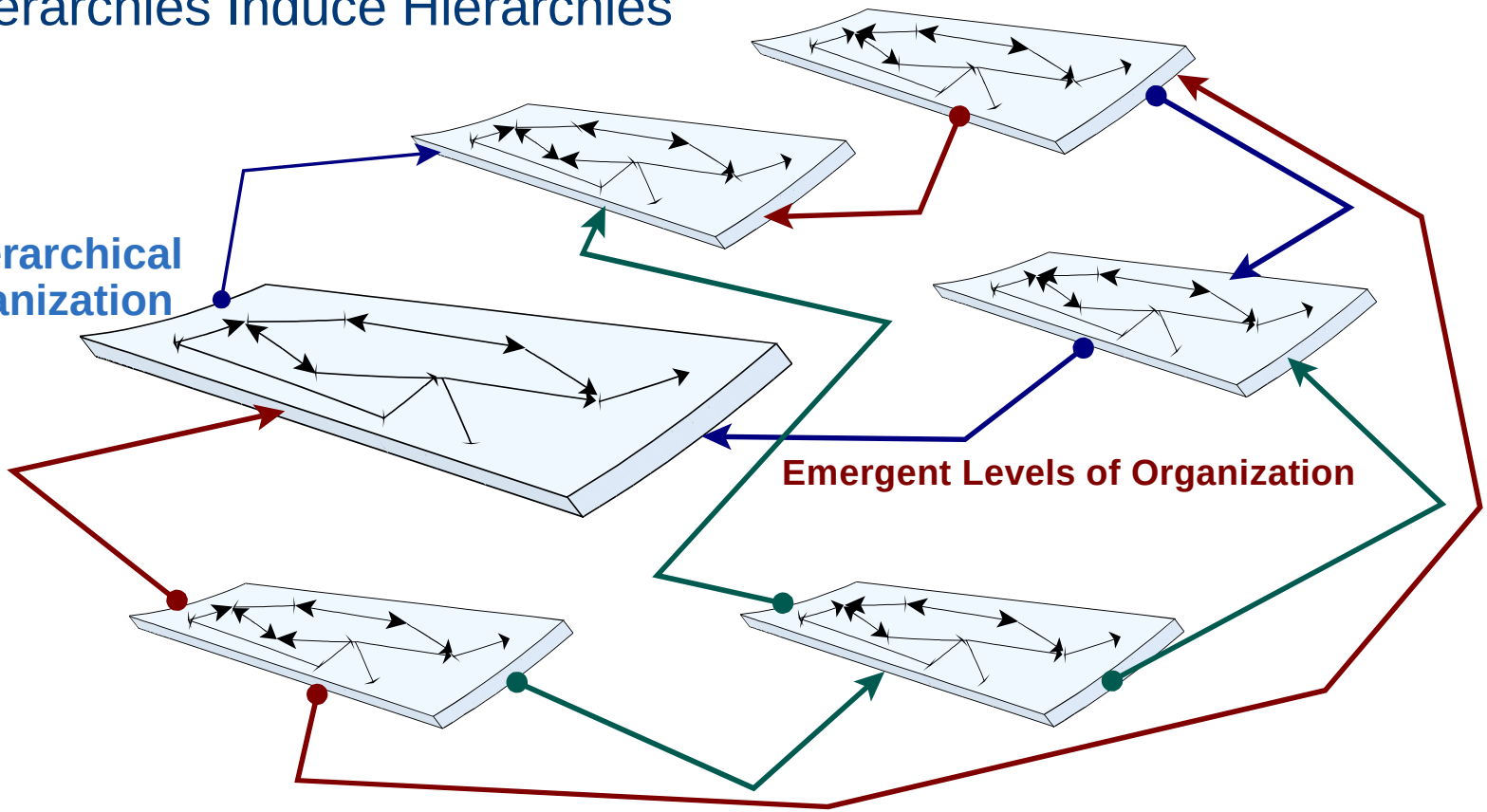

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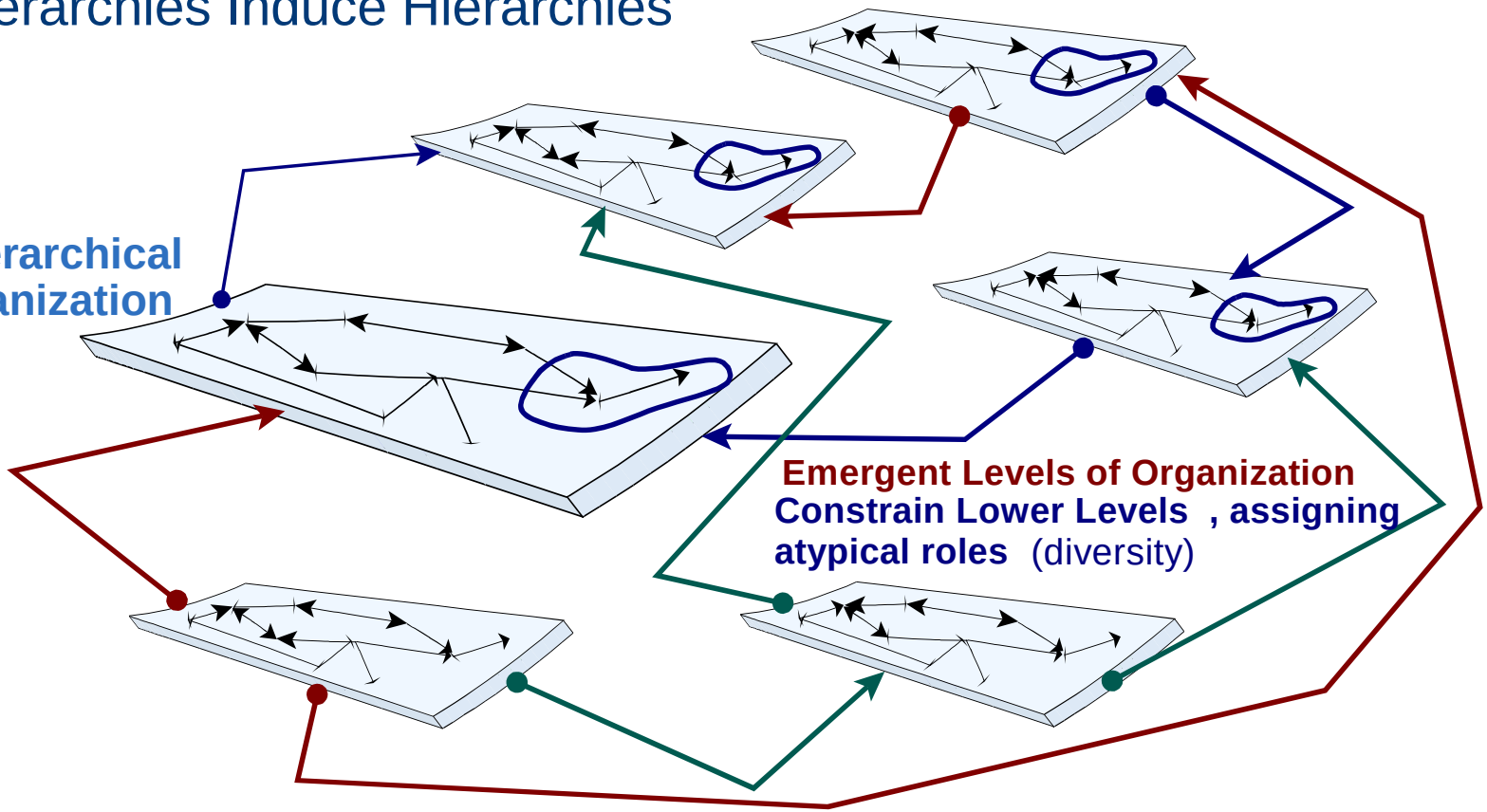

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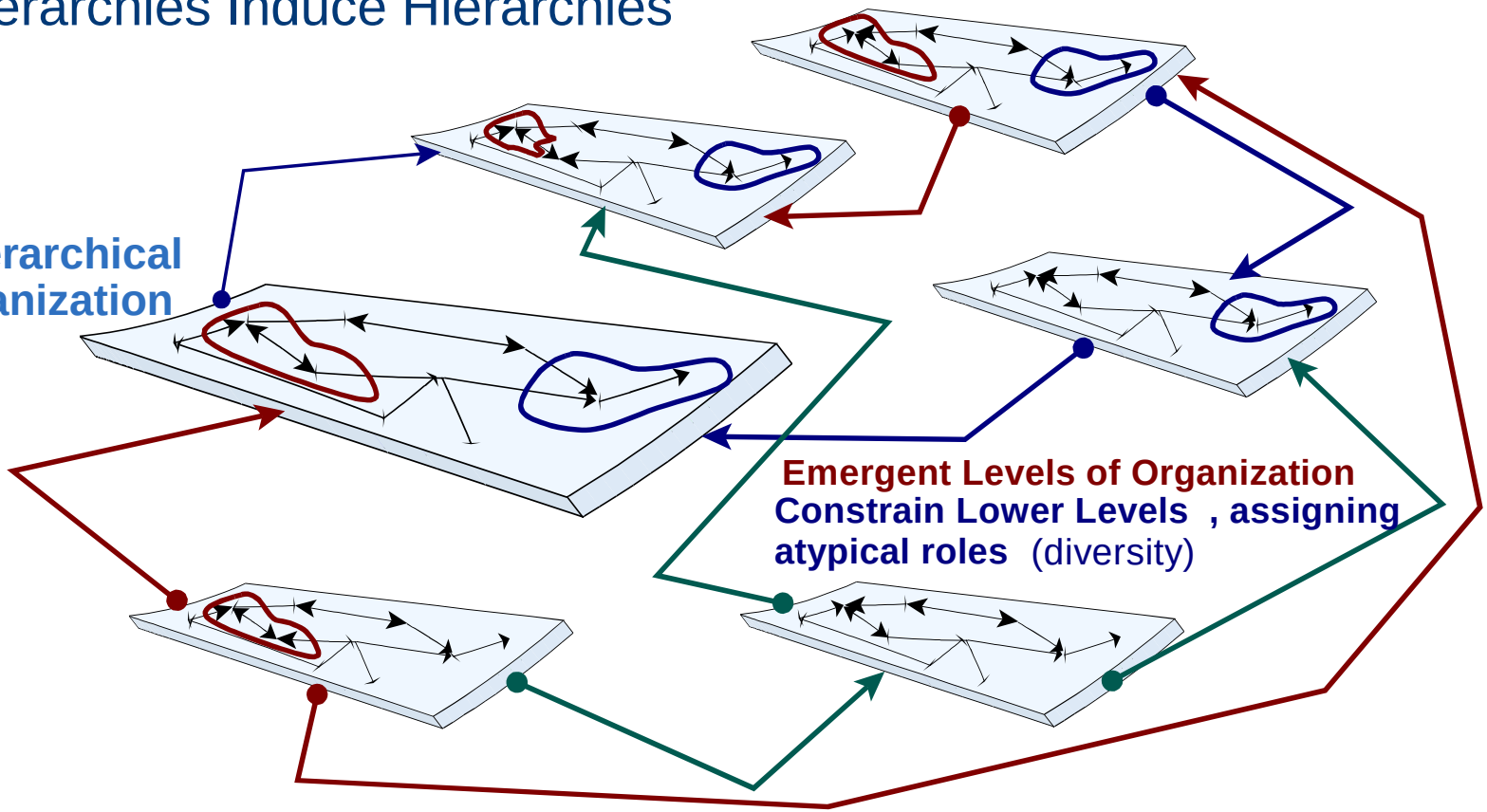

Emergent Levels of Organization Constrain Lower Levels , assigning atypical roles (diversity)

Filtering, Specialization, Cooperation and the like create meta-agents and meta-meta agents and so forth

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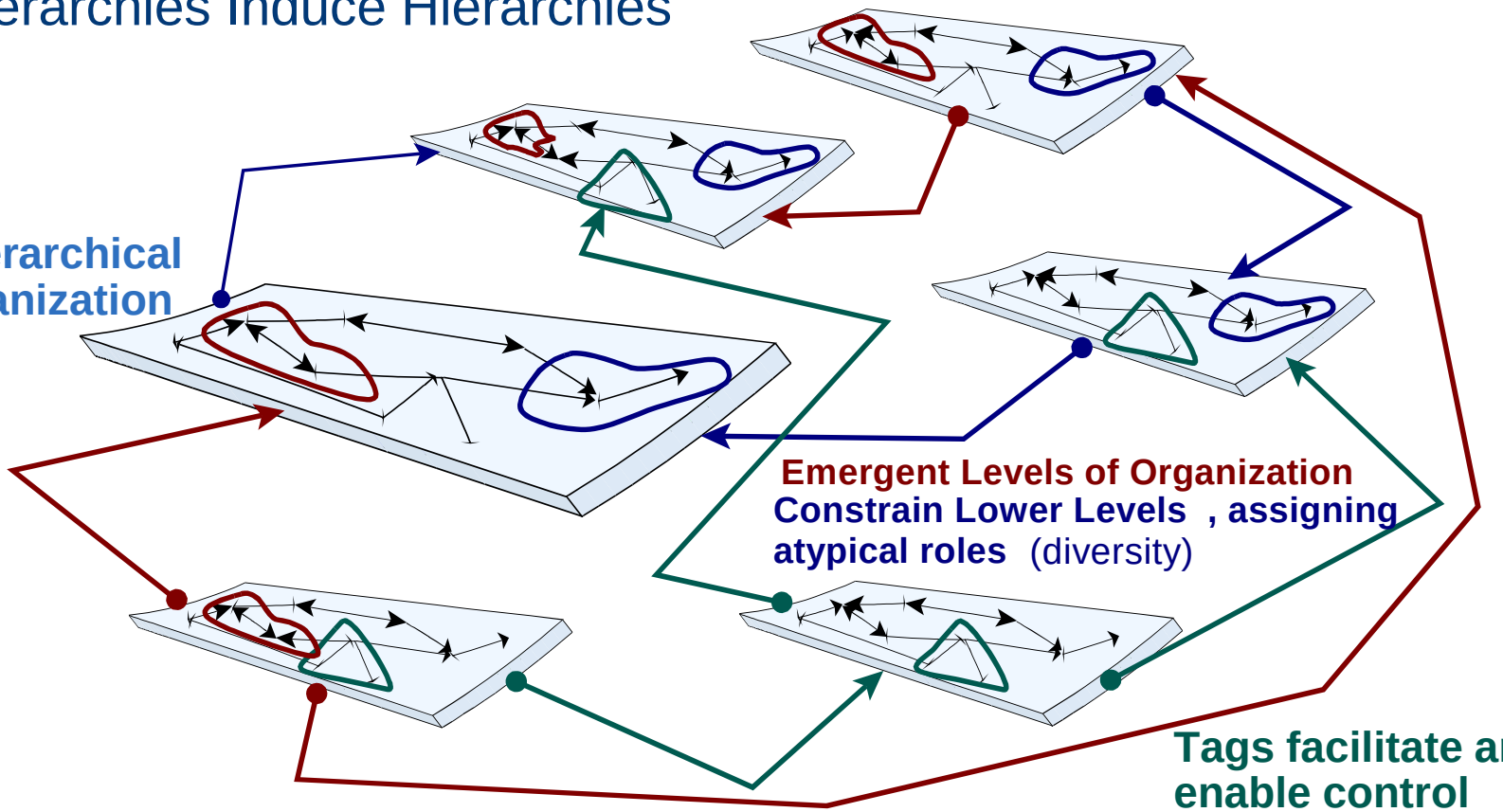

Heterarchical Organization

Emergent Levels of Organization Constrain Lower Levels , assigning atypical roles (diversity)

Tags facilitate and enable control

Filtering, Specialization, Cooperation and the like create meta-agents and meta-meta agents and so forth

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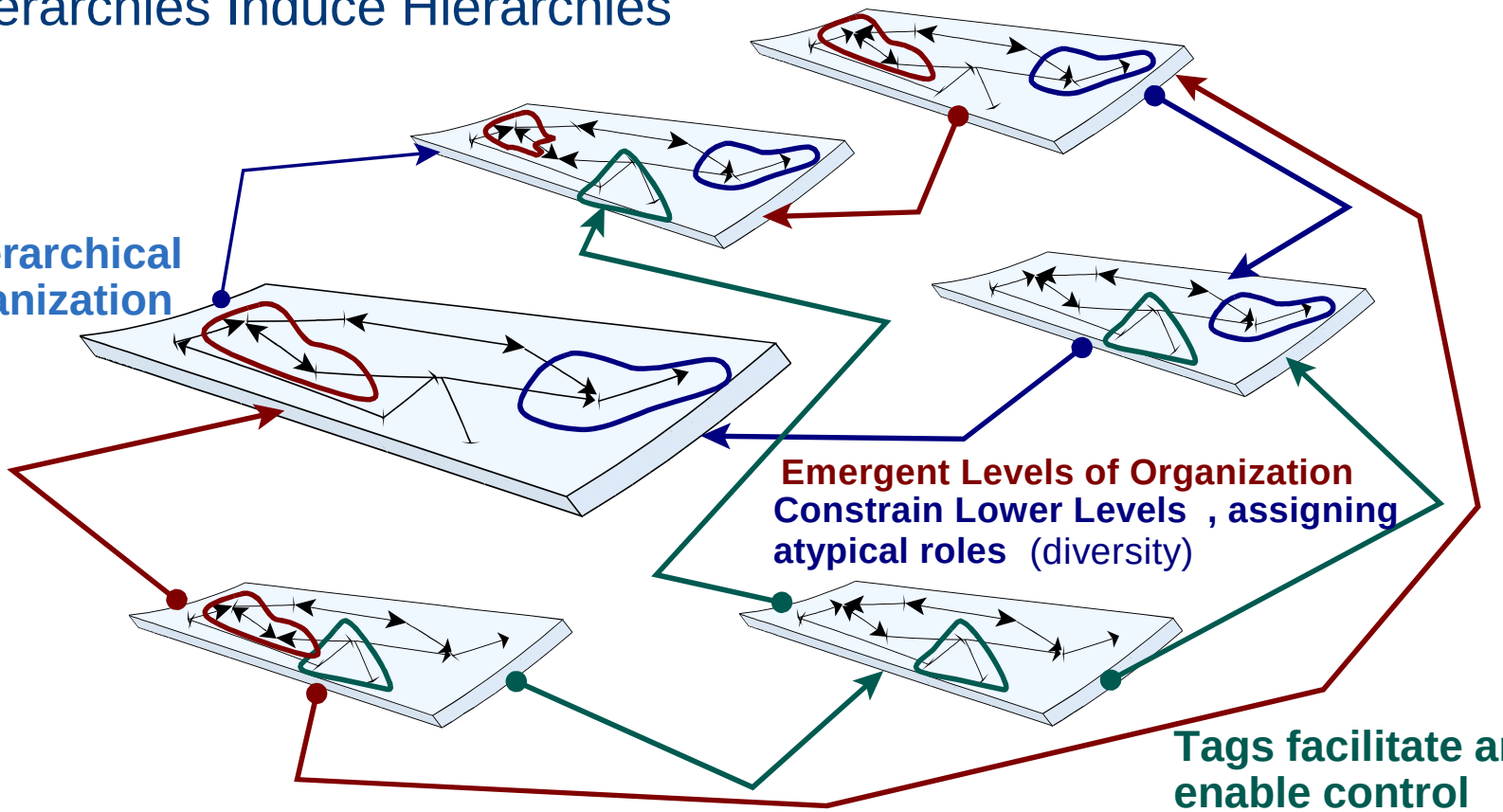

Filtering, Specialization, Cooperation and the like create meta-agents and meta-meta agents and so forth

It is important to study how to discover and generate appropriate tags and communications systems

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Control Hierarchies

From Theoretical Biology

- Not Structural Hierarchies
  - Criteria of number, forces, time scales. Traditional tree or Chinese box.
  - Near-decomposability [Simon]
    - a component at a lower level can be treated as a representative of the collection at each level, which can thus be averaged out to a boundary condition for the level above.
- Control (Functional) Hierarchies or Complex Systems [Pattee/Rosen]
  - The upper level exerts dynamic constraints on the lower level so that lower level dynamics cannot be averaged out (*non-holonomic constraints*)
  - Differentiation at lower levels: specification, diversity, tags, information
- How are heterarchies affected by control hierarchies?
  - Are they the result of multiple, simultaneous control hierarchies?
  - Are their diversity and specification harnessed by hierarchies?
    - Gernot Grabher: The WPP advertising group as an emergent control hierarchical organization (functional heterarchy), e.g. The creation of knowledge communities and trading zones. Is the spacial organization itself a hierarchical constraint?
    - Constraints of wall street on organizations. The setting up of trading creates its own rules which ends up constraining the organizations themselves.
- How to coordinate components in heterarchies?
  - Recognize the control hierarchies, discover and generate appropriate tags and communication systems that preserve diversity, recognize excessive control

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Adaptive Webs

The Communication Fabric of Evolving Heterarchies

- Evolving Knowledge Repositories
  - Distributed Intelligence to store the changing knowledge of an organization (its identity)
  - Preserves diversity and avoids the “curse of the averages”
  - Assumes evolving knowledge, not static structure
- Recommendation Interface
  - Collaborative, proactive communication is essential to maintain internal coherence in a horizontal organization
  - Capability of recommending appropriate documents, components, members, etc.
- Adaptive Web Requirements
  - *Adapt* and *Evolve* with the needs of communities of users
  - *Represent* the knowledge of the organization
  - Automatically identify and tag relevant, emergent *communities of users* (preserve diversity)